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AUTHOR Bartelt, Claudia; Williams, Phyllis
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ABSTRACT

Professional concern about the possible injurious effects of large classes and personal interest in various cognitive style variables led to this particular research at West Valley College (California). The belief persists among teachers, in spite of objective research, that small classes are better. Here, it was hypothesized that (1) class size might influence academic achievement, and that (2) students assigned to a class size they preferred would do better than those not so assigned; it was also hypothesized that students would do better on their preferred exam type. The effect of cognitive style variables on each other and on academic achievement was also considered. The ultimate aim was to help match particular students with particular classes so that learning could be maximized. The sample used in this study consisted of 250 students enrolled in Introductory Sociology with approximately equal numbers of males and females. All students received large class instruction, but some were also broken into small seminar discussion groups. The same teacher taught both sections. Results were obtained for: (1) Cognitive Style Measures, (2) Class Size, Test Preference and Class Preference, and (3) Cognitive Styles and Achievement. One of the major points these findings suggested was that what a student says he prefers in terms of tests and type of class may have nothing to do with his performance within these areas. Preference appeared to be independent of performance. It may be important, however, to allow teachers to pick the class size they feel most comfortable with. (AL)

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RELATIONSHIP OF CLASS SIZE AND VARIOUS COGNITIVE VARIABLES TO ACADEMIC ACHIEVEMENT

Claudia Bartelt
Phyllis Williams

JC 710 256

UNIVERSITY OF CALIF.
LOS ANGELES

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Introduction

Professional concern about the possible injurious effects of large classes and personal interest in various cognitive style variables led to this particular research.

Class size itself has been studied extensively (Gage, 1962) to determine its effect on academic achievement. The general tenor of the results has changed since the 1920's when the Minnesota studies (Hudelson, 1928) indicated that large classes were superior. Macomber and Siegal (McKeachie, 1962) reported small but significant differences favoring small classes. McKeachie (1962) concludes, from his review of research on class size, that large classes are not inferior to small ones as long as traditional achievement tests are used as criterion. The belief persists among teachers, however, that small classes are better. We hypothesized that class size, if it did not directly affect academic achievement, might interact significantly with preference for class size and thus would influence academic achievement. We hypothesized that those students who preferred large classes, for example, and who got into large classes, would do better than those students who disliked large classes, yet were assigned to them. In a similar fashion, we hypothesized that students would perform better in the type of exam (objective or essay) which they said they preferred. As one specific example, students who said they preferred essays to objective tests would do better on essay tests, according to our prediction.

We were also interested in various cognitive style variables: field articulation, category width and dogmatism. We were interested in their relationship to each other and their joint effect upon academic achievement.

Field articulation (Witkin,1962) expresses the extent to which a person is independent of or conversely, overwhelmed by his surroundings. A vast amount of research by Witkin and others (Witkin, 1962) has related this variable to time orientation, suggestibility, kinds of pathology, clarity of vocational plans and specificity of body image, just to name a few. The field independent individual is described as more analytic, and aware of his "inner life" while the field dependent subject is characterized by low self esteem and a tendency to seek direction from without. (Gardner, et al, 1959). Females generally have lower scores than males, ie, are more field-dependent. Witkin 1962). Jackson, Messick and Myers (1964) have indicated that the ETS form of the Witkin Embedded Figures test (Witkin, 1950) is an appropriate substitution for the latter test. Form Cf-1 of the ETS version is a group administered, timed test with a multiple choice format. The task is to decide which of 5 achromatic figures is embedded in a complex pattern. Part I, consisting of 16 items, was used with a time limit of 20 minutes.

Category width (Pettigrew, 1958; Wallach & Kogan, 1964) has been related to risk taking behavior. In general terms, it refers to the breadth of information one is willing to include within a given category. In terms of risk taking, a narrow categorizer would prefer to run the risk of excluding items from a particular category. Broad categorizers would prefer the risk of including too much information. A complete description of the category width test, entitle "Estimation questionaire", may be found in Pettigrew (1958). In brief, the test consists of 20 multiple-choice items, each listing the average value of a particular category such as the length of the average whale. The subject is then asked to give the possible range or parameters of that average such as the length of the shortest and longest whale. High scores on the test reflect broad categorizers.

Rokeach (1960) developed a scale which is supposed to tap the authoritarianism of both those on the political left as well as on the right. Therefore, dogmatism

would refer to a mode of thought rather than to a set of particular beliefs. Other characteristics of dogmatism would include intolerance of ambiguity and rigidity of belief. The scale consists of a series of statement which one can circle as true or false. The measure has been found to be uncorrelated with the Embedded Figures test (Messick & Fritzky).

We hypothesized that there might be interactions between the various cognitive styles such that they would affect achievement scores. We asked college English teachers to describe the kinds of persons they thought would do best on essay tests. We then described the various cognitive styles to them so that they could predict, on these terms, which students would do best on essay and which would do best on objective tests. Their collective prediction was that those doing better on essay versus objiective tests would be high in field articulation (field independent), broad categorizers. There was no specific prediction regarding dogmatism. In addition we thought that test preference and class preference would be associated with one's score on the various cognitive styles.

Aside from intellectual curiousity, the ultimate aim of this kind of research would be to help match particular students with particular classes so the learning could be maximized.

Method

A Sample: Consisted of 250 students at West Valley J.C., enrolled in Introductory Sociology. There were approx. equal numbers of males & females within each introductory sociology section. Students registered for sections with prior information about the sections' differing size. A t test established that there was no sig. difference in G.P A. between the two sections.

B Procedure:

Students in one section were taught as a large class, using the lecture-discussion method. Students in the other section received the same large class instruction and also were assigned to small seminar discussion groups. The same teacher taught both sections.

Initially, students were asked to indicate their preference for small versus large classes and preference for objective versus exxay exams. They were then given tests of category width, dogmatism and field articulation. G.P.A.'s were listed for each student. Each student was given a language skill test which consisted of an essay graded for its English.

During the course of the semester, both essay and objective midterms were given. The objective tests were machine scored. The essay tests were graded by a reader without knowledge of which class the papers came from.

A series of analyses of variance were done to examine the relationship between academc achievement and class enrollment, exam preference and the three cognitive style variables of category width, field articulation and dogmatism.

III Results

A. Cognitive Style Measures

Contrary to Witkin's finding(1954, 1962) there was no statistically significant difference between male and female scores on the test of field articulation (t= 1.19). However, the same lack of significance had been found in a previous study using West Valley J.C. students (Bartelt, 1969). No sex difference in scores on the other two test were found but none had been predicted. The scores on the Hidden Figures test and the Dogmatism scale were divided at the median into high and low scores. The category width test scores were divided into low, medium and high levels.

B. Class Size, Test Preference and Class Preference

A series of two-way analyses of variance showed that scores on both essay tests and objective tests were found to be unrelated to class size, preference for objective versus essay test and class preference. There was no significant interaction among those variables whch influenced academic achievement. F's ranged from 0 to .48. In other words, even though students said they would prefer

essay test or would prefer objective tests, they did no better on their preferred test. Similarly, the type of class preferred by the student was not related to his achievement in the class; whether or not they preferred a seminar to a large class made no difference in their actual performance in these classes. Lastly, academic performance was not associated with the type of class the student was enrolled in. Achievement was no associated with any interaction between class preference and class enrollment.

C. Cognitive Styles and Achievement

With the help of English teachers, it was hypothesized that those doing best on essay exams would be characterized as high in field articulation and category width. The hypothesis was not proved. The highest obtained F was 1.1, statistically insignificant. There was no significant interaction between these two cognitive style variables. No combinations of field articulation and category width were found to be associated with achievement on essay tests.

Other two-way analyses of variance found no relationship between category width and field articalation, or their combined interaction, on test preference. In addition, essay scores were found to be independent of scores on category width, dogmatism and their mutual interaction. In another two-way analysis of variance, field articulation scores were divided by sex to see if any interaction between field articulation and sex would be associated with test preference. No significance was found.

There was a significant difference found in scores on the English skill test ($t = 3.53$, significant at $a=.91$). English skills were found to be higher among those students enrolled in the large class. The tests were grades on a five point scale; the obtained difference was .72.

The drop-out rate was 7.8% for those in the class with no seminars while the drop-out rate in classes with seminars was 16.7%. In real numbers this represents

a difference of eight more students dropping out in the seminar-type class. The difference is not statistically significant (chi square = 3.61).

IV Discussion

One of the major points these findings suggest is that what a student says he prefers in terms of tests and type of class may have nothing to do with his performance within these areas. Preference appears to be independent of performance in these two instances. However, in spite of the lack of significance between achievement and class size, we are still left not only with the students' preference but with the teacher's preference for small groups. The teacher in the study preferred the seminar type sections. She said she learned their names, got to know them better and got more feedback from them. E. H. Hall (1959, 1966), in his discussion of proxemics, suggests that groups of anything over 12 result in an impersonal communication. The preference for small groups with its concomitant emotional satisfaction may have more to do with motives such as the need for affiliation than with the learning process itself. The seminars contained about twenty students each. According to Hall's thesis, even these seminars did not constitute a small group. Perhaps this as well as other research comparing large and small classes are, in effect, comparing large with merely larger groups. Another factor may be that some teachers have large group skills. Such a person may transcend the limiting factors of large groups. The teacher in question, despite her preference for smaller groups, has had considerable experience with large groups and appears comfortable with them. Like much of the method-type research it appears that study of the method itself may not be sufficient. We shall have to study the interaction between method and teacher. It may be important to allow teachers to pick the method, including class size, with thich they feel most comfortable.

We assumed that the autonomous (field independent) and broad category width person would prefer to share ideas in a seminar and would perform better within a seminar and on essay tests. We assumed the field dependent with a narrow category width and a closed mind (high in dogmatism) might prefer to take objective tests and would prefer large groups. We were able to prove none of this. We were limited in our study by our attention to achievement scores. Specific achievement scores may not be why students prefer classes or certain kinds of tests. Other variables might be emotional satisfaction, application of ideas to new situations, interaction with friends and teacher, etc., none of these measurable within the essay and objective test framework.

We chose to compare high and low scores on various cognitive style measures. We did not explore the effect on a class of homogeneous versus heterogeneous cognitive styles. One of the more enjoyable and educative aspects of group process may be the interchange between those high versus low in category width, for example. In addition, the teacher herself was never tested along these dimensions.

We think the similarity in scores between males and females on the Hidden Figures test is noteworthy, especially since these results are a replication of findings from the previous year. Remember that Witkin found the average male to be more field independent than the average female. Assuming this to be true, it may be that the more field dependent, more passive male is going to school close to home while it takes some independence for a female to go on to college rather than to marry or work after high school. The conforming male will try to go to college rather than to marry or work after high school. The conforming male will try to go to college; it is an expectation. With any money or push he will, in addition, attend a state college or university. The average female is expected to finish high school. In many cases the decision is left up to her. She is supported in her choice to attend a four year school in fewer instances than with males. The identical choice of a junior college, especially an academic curriculum, may be made by a more passive male and a more striving female. I do not present this reasoning as a conclusion but as speculation to suggest further research and study.

REFERENCES

Bartelt, C. A. "The Relation Between Field Articulation, Locus of Control and Subjective Probability of Success." Unpublished doctoral dissertation, University of California, Berkeley, California, 1969.

Gage, N. L. (Ed) Handbook of Research on Teaching. American Educational Research Association, 1963.

Gardner, Riley; Philip Holzman; G. S. Klein; Harriet Linton; and Donald Spence. "Cognitive Control" Psychological Issues 1:4, 1959.

Hall, Edward T. The Silent Language. Garden City, New York: Doubleday & Co., 1959.

Hall, Edward T. The Hidden Dimension. Garden City, New York: Doubleday & Co., 1966.

Hudelson, E. Class Size at the College Level. Minneapolis: University of Minnesota Press, 1928.

Jackson, D. N.; S. Messick; and C. T. Myers. "Evaluation of Group and Individual Forms of Embedded Figures Measures of Field Independence" Education and Psychological Measurement 23, pp. 177-192, 1964.

Kogan, Nathan and Michael Wallach. Risk Taking. New York: Holt, Rinehart & Winston, 1964.

Messick, S. and J. J. Fritzky. "Dimensions of Analytic Attitude in Cognition and Personality." Princeton, New Jersey: Educational Testing Service, 1963.

McKeachie, W. J. "Research on Teaching at the College and University Level." In Gage, N. L. (Ed) Handbook of Research on Teaching. American Educational Research Association, 1963.

Pettigrew, T. F. "The Measurement and Correlates of Category Width as a Cognitive Variable" Journal of Personality 26, pp 532-544, 1958.

Witkin, H. A. "Individual Differences in Ease of Perception of Embedded Figures" Journal of Personality 19, pp 1-15, 1950.

Witkin, H. A. and Ruth B. Dyke, et al. Psychological Differentiation. New York: Wiley & Sons, 1962.

Witkin, H. A. and Helen B. Lewis, et al. Personality Through Perception. New York: Harper Brothers, 1954.